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City Club of New York

Subway overcrowding

[New York]

1930

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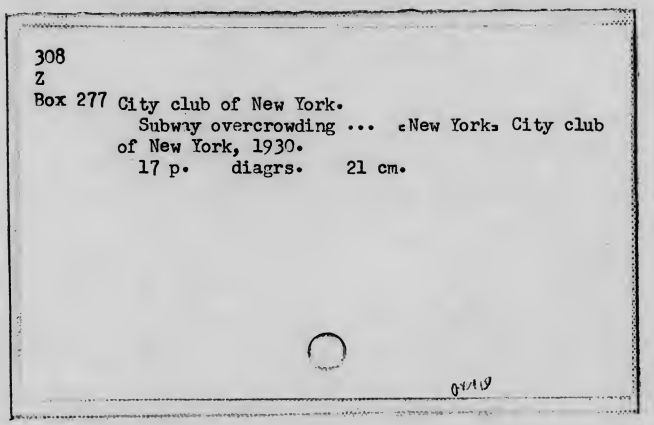
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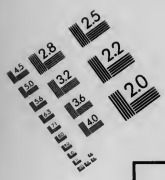

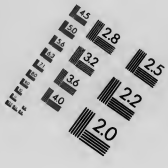

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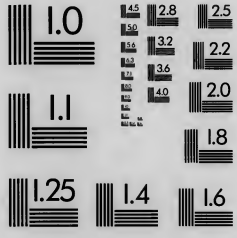

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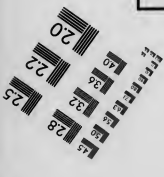

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SUBWAY OVERCROWDING

In 1907 the City Club published a memorandum which it had submitted to the then Public Service Commission of the First District in relation to the transit situation in New York City at that time. The Club's memorandum was prepared after studies made with expert assistance.

The memorandum went into such questions as the extent to which subway trains were over-crowded in rush hours and various steps that might be taken to relieve the then rush hour congestion. The memorandum cited the following provisions as contained in Contract #1 governing the operation of the first subway that came into existence in New York City:

> "The Contractor shall, so far as practicable, meet all reasonable requirements of the public in respect of frequency and character of its railway service to the full limit of the capacity of the railroad." "The Contractor covenants to and with the City that the Contractor will, during the term of the lease, operate the railroad carefully and skilfully, according to the highest known standards of railway operation." "The Contractor shall at no time and in no event be at liberty to object to the plans or specifications upon which the railroad has been constructed, or the manner of its construction, maintenance or operation." "The cars shall be so constructed as to facilitate to the utmost a quick discharge and loading of passengers."

Various charts or diagrams were published by the Club at that time to indicate graphically the extent of over-crowding. We reproduce herewith a typical chart as a basis of comparison in the following discussion of the problem as it exists today. (See Plate I.)

The Public Was Aroused

The memorandum was received by the press with enthusiasm. The public responded immediately to the graphic representation of what seemed then to be scandalous conditions. The New York Times in an editorial in its issue of July 22nd, 1907, characterized the report as one "which affords the first ray of light to those who have been hoping against hope that there might be some result to all the agitation." The Times looked forward to

PLATE I

Chart published by City Club in a memorandum to the Public Service Commission July 22, 1907, indicating northbound express trains passing through Grand Central Station during rush hour between 4:30 and 7:00 P. M. April 9, 1907. Each column represents an express train; width of column indicates length of stops and space between columns indicates interval between trains.

"large and quick relief for strap-hangers" and urged "more cars", "more doors" and looked forward to the time when "trains can be run faster and oftener."

The Evening Post said:

> "The City Club finds that in almost every instance there are remedies for overcrowding or poor service which require nothing more than administrative orders to come into being. . . . .
>
> "There is a certain inertia in such matters in most of our railroad corporations, with one or two exceptions, which must be overcome either by means of aroused public sentiment or by some official pressure. Now public sentiment has, as everyone knows, become immediately effective in this city only when some catastrophe has happened, . . . or when certain wrongs have passed the limits of our extraordinary American patience and endurance."

The whole general effect of the agitation was to place the Public Service Commission in an offensive position and the Companies were placed on the defensive.

Official Efforts Made to Improve Service

One of the immediate results of the investigation by the City Club was the employment by the Public Service Commission of a competent engineer, Bion J. Arnold, to make a careful study of the conditions of operation of the subways as set forth in the Club's report. Accordingly, designs, arrangement of stations, signals and other technical engineering subjects were studied by Mr. Arnold and a series of reports based upon those studies was printed by the Public Service Commission. Consequent improvements were made in the signal system, bringing about shorter station stops of trains, and most important of all, center doors in all I. R. T. subway cars were installed. Subway express trains were lengthened from 8 to 10 cars, and the local trains were lengthened from five cars to six.

No steps were taken, however, definitely to prevent overloading. No standard for loading with regard to the health, comfort and safety of the public seems to have been considered. Owing

to the lack of such standard, the overcrowding of subway trains has been allowed to increase until the congestion today indicates that conditions have for practical purposes gotten out of hand.

Tremendous Growth in Traffic

The growth of rapid transit traffic in New York City during the past twenty years has been tremendous. There has been an increase in the number of passengers carried from 630,000,000 in 1908 to over 1,900,000,000 in 1928, or an increase of over 200%. In the same period of time there has been an increase in the population of the greater city of only about 40%. This indicates clearly the steady growth in the rapid transit riding habit of the public, and accounts for one of the complicated elements that must be considered in connection with the city transportation system.

Subway overcrowding has grown so rapidly that it is generally thought by the public and by public officials to be impossible to provide new facilities as fast as the traffic has increased. Thus the existence of the evil is often overlooked or ignored.

The Great Economic Loss to the Riding Public

The effect of this inhuman overcrowding on our working population which must use the subways daily at the rush hour, is difficult of analysis and measurement, but must be tremendously and inescapably harmful. The actual physical injuries incurred from violent methods used by the stronger passengers in boarding and leaving trains and the strong-arm methods of guards who pack the passengers in, are numerous and serious. But the total physical injury does not begin to compare with the nervous and physical fatigue incurred under present conditions. Who can estimate the reduction in work capacity of an employee who has to travel an hour in the morning with the struggling mass that is forced into our inadequate transit facilities? If it could be measured in money values, it would undoubtedly run into many millions of dollars—lost—wasted. How much happiness is destroyed, how much leisure time is spoiled by the terrific nervous strain involved in getting home after a hard day's work! To translate these things into charts and tables is impossible, but their economic and social importance cannot be overestimated—and they are on the loss side of the ledger. The people of the City of New York have a right to conditions of transit that will not tax their energies and patience to the breaking point.

A Basis for a Standard Load

Believing as we do that it is not too late now to set up standards of subway loading, it is the purpose of this pamphlet to attempt to establish such standard upon which, we, and the public as a whole, may judge present and future conditions of subway operation. We attempt this in the hope that it will contribute something to the general cause of the health, safety and convenience of the public. In this attempt, we bespeak the patient and sympathetic consideration of all citizens, and especially public officials in bringing about the improvement which everyone recognizes must ultimately be made if we are to preserve the health and well-being of subway riders in the rush hours.

The primary consideration in fixing the standard load for subway cars would normally be that of public health. Such standard has been considered in past years. We find in testimony* taken by a Commission appointed under the authority of the Board of Estimate and Apportionment, in 1916, to study building districts and restrictions in New York City, that Daniel L. Turner,

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*(*Statement of D. L. Turner, Deputy Engineer of Subway Construction, Appendix IV, page 191, Report of Commission on Building Districts and Restrictions, Published by Board of Estimate and Apportionment, 1916.*)

Air Space Per Subway Passenger

The subway cars are nine feet wide and fifty-one feet in length, including the platforms.

The height of the subway cars is twelve feet above the base of the rail. The body of the car is about eight feet high. These dimensions give the subway car a cubic content of approximately 3,672 cubic feet. Counting 200 passengers to the car each person would have an air space of eighteen and a half cubic feet.

Consulting Engineer of the Transit Commission, and formerly Deputy Engineer of Subway Construction for the Public Service Commission, quoted the then Health Commissioner, Dr. Haven Emerson, as having agreed with his own theory, "that rapid transit lines, or any municipal transit lines ought to be permitted a capacity at rush hour of about 50% over the seating capacity." Mr. Turner based his estimate on the then standard seating capacity of the I. R. T. car which the Public Service Commission placed at 50 passengers. According to Mr. Turner's testimony, as a rule the capacity load of an I. R. T. subway car, in 1916, was about 125 persons, but on the basis of 50% over the seating capacity, in the judgment of Mr. Turner and also in the judgment of Dr. Emerson, the load of the I. R. T. car should not exceed 75 persons.

While it might be physically possible to provide a sufficient number of subway cars to meet the suggested public health standard as an average load for trains operated during the rush period, the problem presents considerable difficulties.

It becomes obvious therefore that a standard based upon seating capacity such as that used in 1907, or a standard based upon the theory of public health as outlined above, is not feasible. We find, too, that passengers frequently stand when seats are available. They stand when approaching their destination and when riding only short distances.

Standard for Limiting Subway Congestion

My theory is that rapid transit lines, or any municipal transit lines, ought to be permitted a capacity at the rush hour, of about fifty per cent over the seating capacity. The rush hour of course is not the peak—the peak, where the load is very much in excess of the average for the hour, is fifteen or twenty minutes only in duration. I arrive at this carrying capacity during the rush hour from the standpoint of permitting free circulation in the cars. That has no bearing on the health standpoint. I had a talk with Dr. Emerson, the Commissioner of Health, and he arrived at the same conclusion from the health standpoint—about fifty per cent overload.

You understand that we could not accomodate, or take care of the business of New York on such a basis. We have to carry to business in New York City, over all lines—surface, elevated and subway, somewhere in the neighborhood of half a million people in one direction in one hour. A seating capacity standard is financially impossible. Neither would it be a physical possibility under present conditions.

The City Club's Standard

Hence, it becomes necessary for us to establish some other standard. In adopting a set of principles as a means of determining a new standard for the different types of subway cars, the Transportation Committee of the City Club has made careful investigations of the different factors which must be considered. The Committee has made measurements of the car bodies, the width and depth of seats and the space occupied by persons of different build. It has experimented with models and diagrams of cars and has observed actual conditions of car loading and unloading and the movements of passengers in and out of trains. On the basis of the observations made, it is believed that our subway riders would be satisfied without provision for a seat for each passenger if conditions during the rush hours could be made to conform to a standard of common human decency based upon the following four principles:

1. Every standing passenger should have some handle or support that he can grasp to steady himself.

2. Every standing passenger should have enough room to move his arms freely, as, for instance, to reach to his pockets for a handkerchief when necessary.

3. Every standing passenger should be far enough from his neighbor so that his face shall not be directly before that of another person.

4. There should be room enough for a passenger to move freely toward an exit as the train approaches his destination.

The determination of a standard carload in existing subway cars permitting conditions compatible with "common decency" according to our definition, can be arrived at only by a general concensus of opinion among those who have studied the problem. Each person is entitled to his own opinion. This is the City Club's opinion. Several variable factors are involved, among them the type of seating arrangement, and the arrangement of doors, posts or straps. Bearing in mind the principles outlined above, the following table shows what we have determined should be the maximum load for the several types of cars listed.

Type of Car	Length over all	Width over all	Seating Capacity	City Club Standard Load	Estimated Capacity
I. R. T. Standard	51′ ½″	8′ 10″	44	125	200*
B. M. T. Standard	67′	9′ 10-15/16″	78	192	300*
B. M. T. Articulated (three unit)	137′	9′ 10-15/16″	160	398	555*
Proposed 8th Avenue	60′ 6″	9′ 9″	60	180	260*

*These are estimates made by responsible officials either of the Companies or public agencies.

The diagram on the opposite page (Plate II) shows the outlines and seating arrangement of the three types of cars that are in use in the New York subways, and the car that it is proposed to use on the new Eighth Avenue system.

The top diagram of the B. M. T. articulated car represents one-half of a car made up of three articulated sections.

The standing passengers have been indicated by elliptical figures drawn to the scale of the diagram giving each standing passenger the average dimensions of 12 by 18 inches. The attempt has been made to get as many standees into the car as possible, bearing in mind the principles set forth earlier as limiting factors. If the reader feels that it is human, decent or tolerable to crowd one, two, three or more passengers into these cars he will vary our conclusions somewhat. We invite our readers to observe the degree of crowding and count the passengers the next time they ride a crowded subway car, and judge our conclusions accordingly. We feel certain, although opinion may vary within a small margin, that we have given the traction companies the benefit of every doubt in the application of the principles earlier enunciated in this pamphlet. Yet we respectfully direct the reader's attention to the actual conditions as portrayed in the accompanying charts. (See Plates III, IV, V, VI, VII, VIII.) If our standard load is the limit of common decency, it would be hard to describe the prevailing loads.

PLATE II

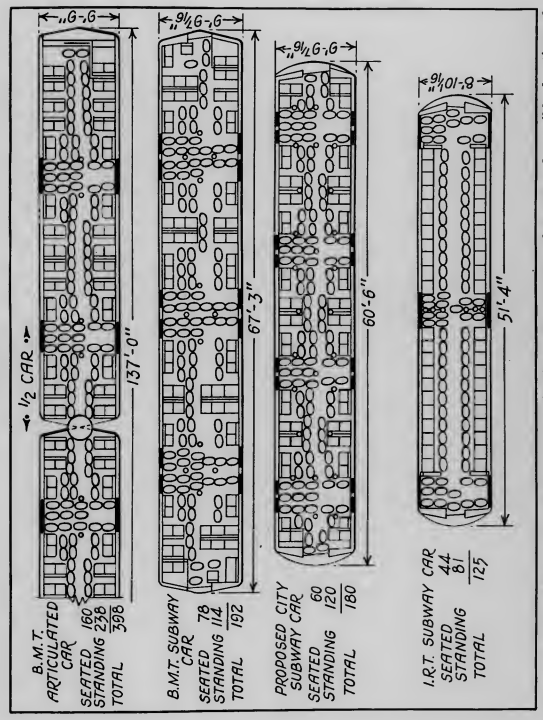

Diagram of 4 types of subway cars showing arrangement of seats and possible location of standing passengers according to the principles determined by City Club for standard load.

The most casual glance at the following charts* reveals a situation that is simply intolerable. Every fraction of an inch of solid black column represents human beings crowded together and jammed tight in a way that one unfamiliar with the situation would regard as impossible. The City Club regards those black columns as representing a condition that is indefensible, inhuman and beyond any reasonable standard of common decency; a condition that reflects unfavorably on every agency involved—the voters, the city administration and the transit companies. That such conditions prevail, might suggest that the citizens of the city are apathetic to a horrible experience occurring daily and inevitably in the lives of a vast number of them. It is impossible to believe that such apathy exists.

The unmarked, white, lower sections of these columns, each representing a train, indicates the seating capacity of the trains. On the I. R. T. system, this section is almost constant because the same type of car is used throughout and trains generally are of a standard ten-car length. On the B. M. T. system the train seating capacity varies because of two different types of car and varying train lengths. Years ago any load above the seating capacity was considered overcrowding, as we have indicated in the City Club's 1907 pamphlet. See where we would be today on that basis! We still feel that that standard should apply to non-rush hour traffic. But we were reluctantly forced to consider that standing passengers were inevitable. Consequently as explained in our car diagrams, we worked out the maximum number of standing passengers that could be loaded into a car and still preserve a humanly decent condition. The shaded section of the columns represents this maximum *legitimate standing load*. Again it will be seen to be fairly constant for all trains on the I. R. T. system and varying on the B. M. T. for the same reasons, that seating capacity is constant and varying respectively. The position at which the upper heavy black line cuts across the columns, represents the point in each train load that is within the *City Club's Standard*. It will be observed that certain trains are

*The charts appearing in Plates III to VIII inclusive are made from figures taken in official counts made by the Transit Commission.

PLATE III

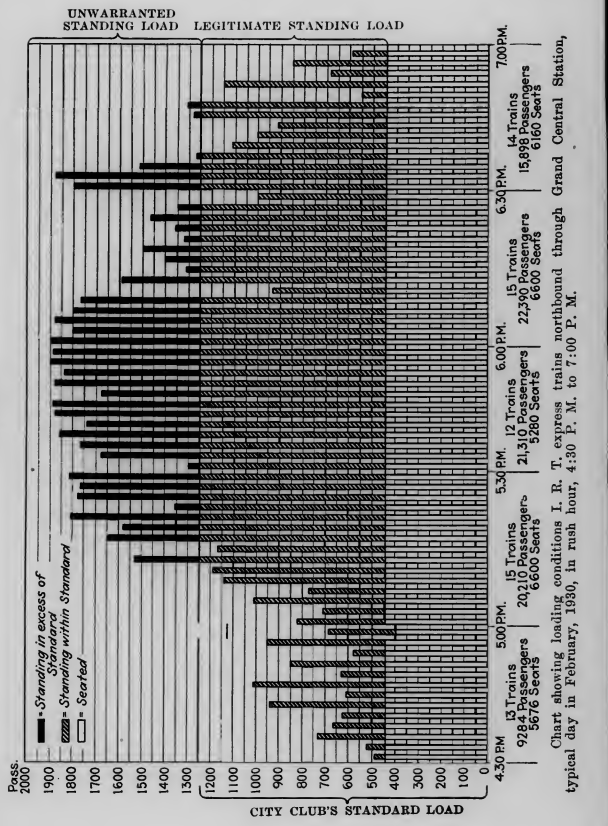

Chart showing loading conditions I. R. T. express trains northbound through Grand Central Station, typical day in February, 1930, in rush hour, 4:30 P. M. to 7:00 P. M.

PLATE IV

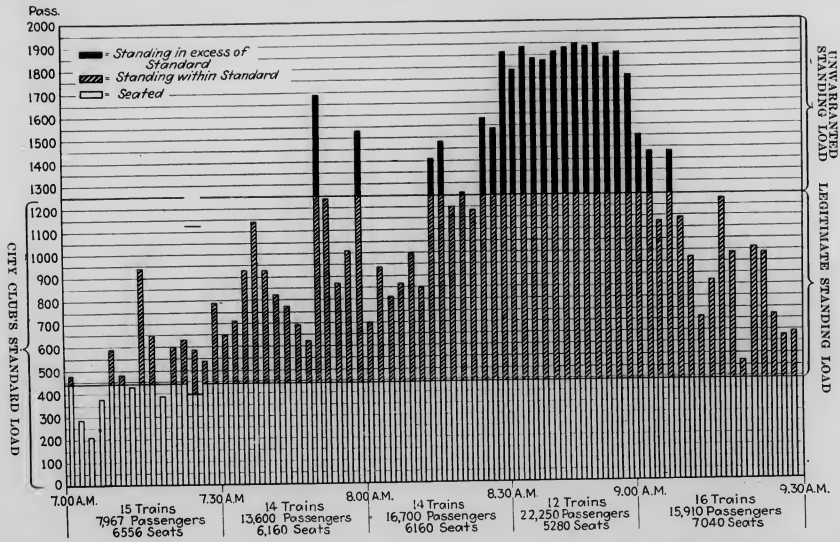

Chart showing loading conditions I. R. T. express trains southbound through Grand Central Station, typical day in February, 1930, 7:00 A. M. to 9:30 A. M.

PLATE V

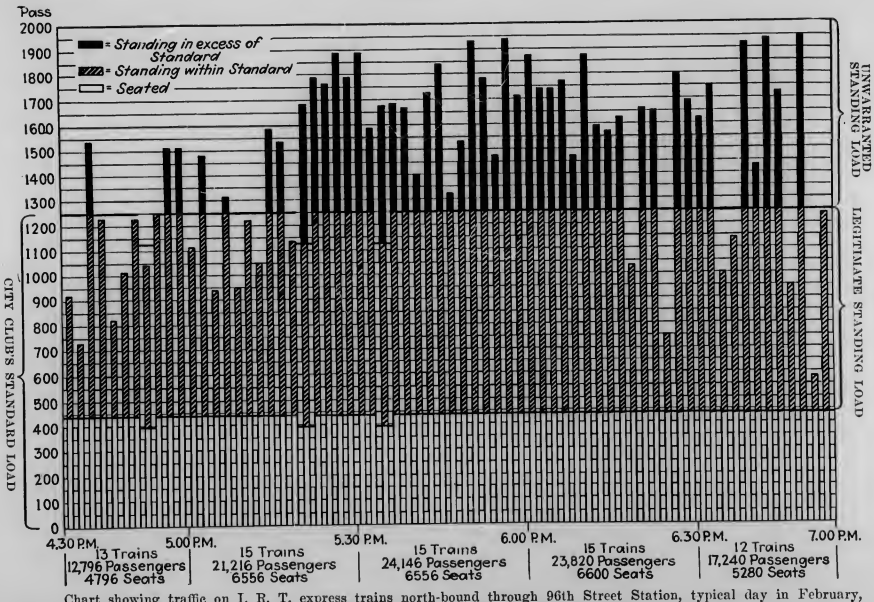

Chart showing traffic on I. R. T. express trains north-bound through 96th Street Station, typical day in February, 1930, in rush hour, 4:30 to 7:00 P. M.

PLATE VI

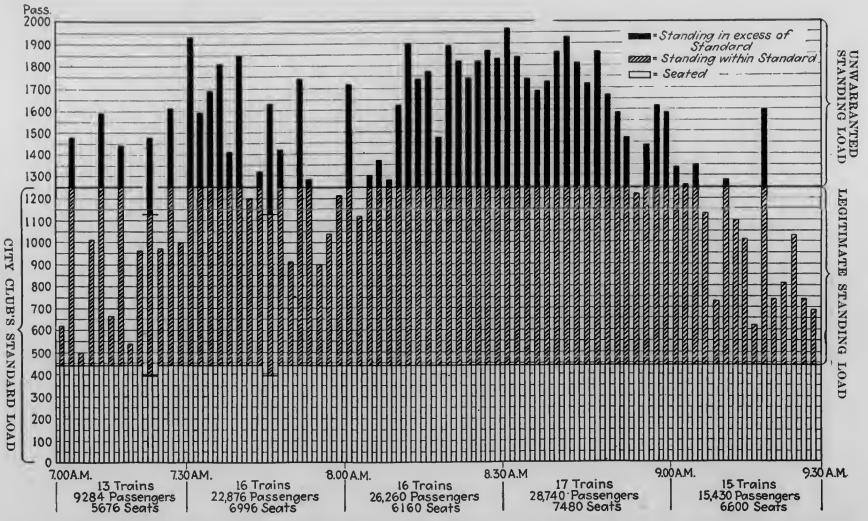

Chart showing traffic on I. R. T. express trains south-bound through 96th Street Station, typical day in February, 1930, 7:00 A. M. to 9:30 A. M.

PLATE VII

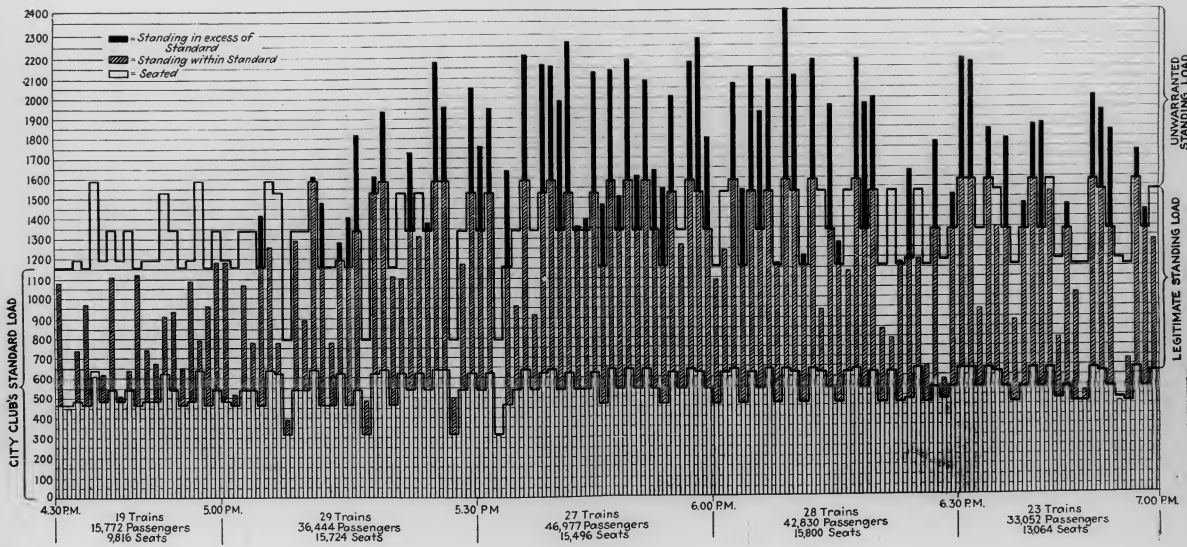

Chart showing traffic on B. M. T. trains east-bound through De Kalb Avenue Station in Brooklyn, typical day in February, 1930, during rush hour, 4:30 P. M. to 7:00 P. M. Variation in type and number of cars in trains operating over both tunnel and bridge routes accounts for zigzag lines indicating variation in capacity for both seated passengers and legitimate standing load.

PLATE VIII

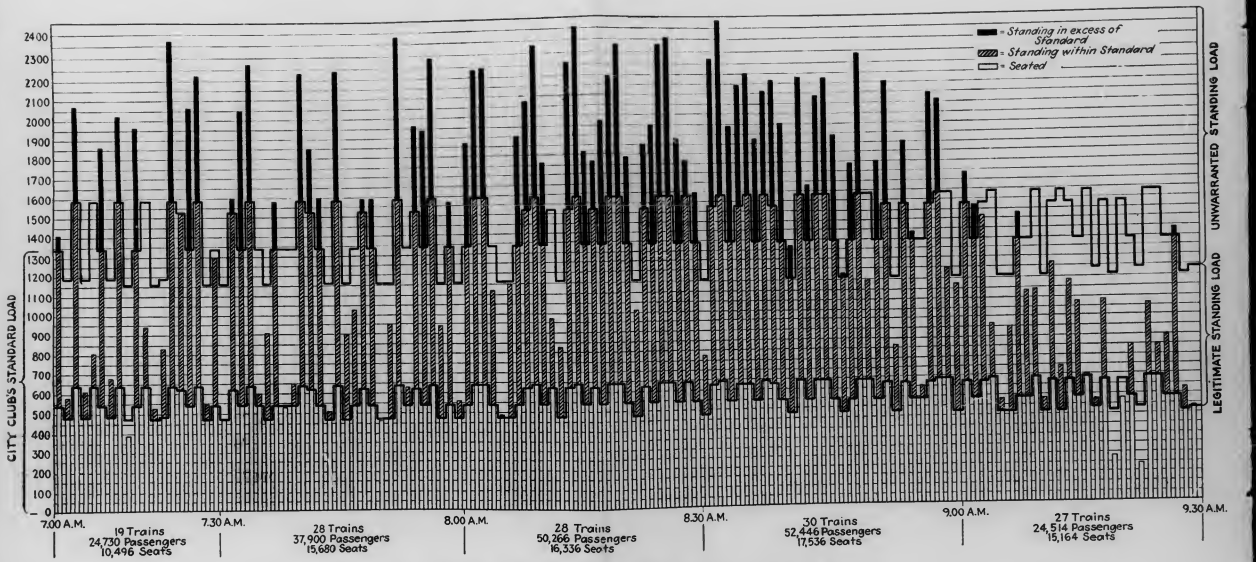

Chart showing traffic on B. M. T. trains west-bound through De Kalb Avenue Station in Brooklyn, typical day in February, 1930, 7:00 A. M. to 9:30 A. M. Variation in type and number of cars in trains operating over both tunnel and bridge routes accounts for zigzag lines indicating variation in capacity for both seated passengers and legitimate standing load.

not filled with standing passengers up to the limit of capacity which we have set. But every passenger above that line represents an increasingly intolerable overcrowding. It will be observed that at the peak some trains are carrying almost twice the standing load that we conceive to be the maximum for decent human beings.

The overcrowding at De Kalb Avenue, though in some respects worse than at Times Square and Grand Central, is more difficult of analysis, because the trains arrive from different sources and proceed to different destinations so that even in the rush hours there will be a train that is not overcrowded while the next will be terrifically jammed. However, it is not within the scope of the present pamphlet to analyze the sources of overcrowding, but merely to indicate the extent of the evil. That the evil is present to an overwhelming degree at De Kalb Avenue, is evident from the two charts representing the situation at that subway station.

Conclusion

The City Club is impressed with the seriousness of the condition here represented on the basis of the standard load which we have heretofore set forth, and in a pamphlet to follow proposes to suggest remedies. One of the most unsatisfactory features of the existing situation is the fact that no more express trains per hour per track are being operated at the present time on the lines of the Interborough system than were operated in 1907 on the first subway line. No doubt this is largely due to the fact that the trains today are so overcrowded that the station stops are inordinately long, and also to the fact that more trains cannot be handled through the more congested express stations, such as Times Square and Grand Central. It seems apparent that if a standard subway load had been adopted in 1907 or soon thereafter, and continuous efforts made to secure conformity to that standard, there would have been greater stimulus to the ingenuity of engineers and operating officials to have kept pace with the increase of traffic by providing for improved methods of handling the riding public.

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THE CITY CLUB OF NEW YORK

Established 1892—"To aid in securing permanent good government for the City."

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